Characterization and stability evaluation of thymoquinone nanoemulsions prepared by high-pressure homogenization

Abstract

Despite the pharmacological properties of thymoquinone (TQ), its administration in vivo remains problematic partly due to its poor water solubility, leading to low absorptivity and bioavailability. Hence, the objective of this study is to prepare, characterize, and evaluate the stability of TQ nanoemulsion (TQNE). Conventional emulsion from TQ (TQCE) and empty nano- and conventional emulsions from Triolein (TRNE and TRCE) are also produced for comparison purposes. The oil-in-water nanoemulsions of TQ and Triolein were produced by high-pressure homogenization. Emulsions were characterized physically by droplet size, polydispersity index, zeta potential, and refractive index. The changes of these parameters in TQNE samples stored for 6 months at 4 and 25°C were not statistically significant ( ). In addition, the initial particle sizes of TQNE and TRNE were 119.6 and 119.5 nm, respectively. Stability studies were also performed for the period of 6 months. At the end of the experiment, the percent of remaining TQ in TQNE at 4, 25, and 40°C was 90.6, 89.1, and 87.4 % respectively. Slower degradation of TQ indicated the chemical stability of TQ in TQNE samples. These results indicated that TQNE is stable over a period of 6 months.

Keyword: Thymoquinone nanoemulsions; High-pressure homogenization; Thymoquinone